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A single, 2 dimensional (2D)-layer of graphite, graphene has attracted significant attention due to its unique structural and physical properties. Graphene is an ideal electrode material due to high electronic conductivity, high surface area, mechanical strength and low mass density [1-3]. High porosity and low density combined with electronic conductivity is desirable in materials for energy storage (supercapacitors and batteries) and energy conversion such as fuel cells. 3D-graphene is a compact network of 2D-graphene structures and has recently gained other attention in these contexts [4-6]. Their porous structures with huge surface area have enhanced charge transport and storage capacities [4], highly important in fuel cells, as large amounts of catalysts can be loaded. This is essential to obtain high power density in the fuel cells. As one type of fuel cells, biofuel cells rest on the use of enzymes or even whole living organisms as catalysts [7]. Major advantages of biofuel cells are that no noble metals are needed and that they operate at ambient temperatures and neutral pH, opening for "green" energy technology.

Our work aims at chemical synthesis and use of microporous 3D-graphene foams. Chemical synthesis is *via* hydrothermal reduction. Architectures are analyzed by microscopic and electrochemical methods. Immobilization of enzymes will be achieved using linker molecules or activation of the graphene surface. We expect that 3D-graphene foams in biofuel cells will greatly enhance enzyme loading and stability. Proper choice of materials and device design offer increased power and current density, extended open-circuit voltage range, and low cost. This could make graphene-based biofuel cells competitive with other, more common catalyst nanomaterials such as carbon nanotubes or metallic nanoparticles.

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